TERRESTRIAL INVERTEBRATE SURVEY FOR CARDIFF PARKWAY, ST. MELLONS. CARDIFF

2019

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1.0 INTRODUCTION

1.1 Rachel Hacking Ecology Limited was commissioned in 2019 by Ove Arup & Partners (Arup) to undertake a terrestrial invertebrate survey of a parcel of land east of Cardiff city centre. Cardiff Parkway Developments Limited are proposing to develop a Scheme that is an Employment-led development including a new railway station and park & ride facility. An Outline Planning Application is to be made and for the following:

- Railway station: New mainline train station served by Great Western Railway (GWR), Cross Country and Wales and Borders (W & B) trains;
- Park & Ride facility: a car park of 500 – 2,000 spaces;
- Business park: new business park accommodating 5,000 – 20,000 jobs;
- Ancillary Development: Landscaping, infrastructure works (e.g. energy, water), and access.

1.2 The proposed development site lies to the east of Cardiff, in St. Mellons (O.S. gird reference: ST251808 - see Figure 1). The site currently comprises numerous reens, woodland, semi-improved grassland, arable, marshy grassland and scrub. Hendre Lake lies within the western part of the site and a main railway line bisects the site. The site lies within the Gwent Levels – Rumney & Peterstone Site of Special Scientific Interest (SSSI). The Gwent Levels SSSI is renowned for its aquatic and terrestrial invertebrate assemblages.

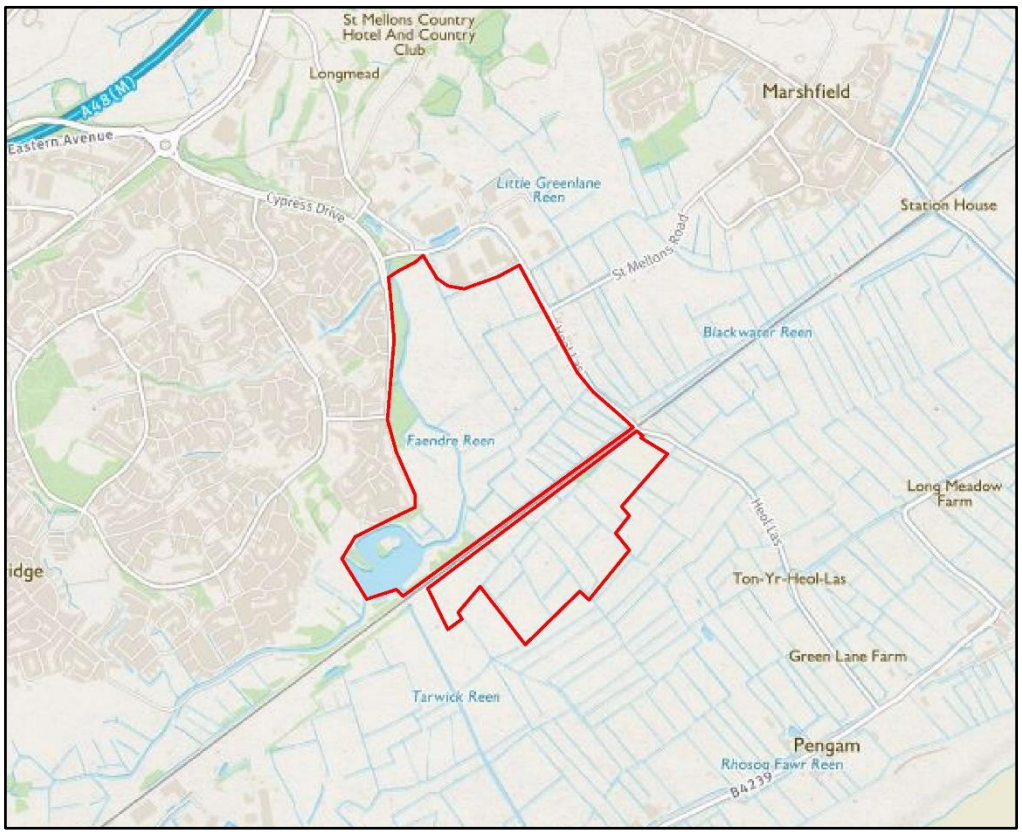

Figure 1 showing the site location edged in red

1.3 An aquatic invertebrate survey was undertaken in July 2018 (David Clements Ecology Limited). Incidental terrestrial invertebrate records were included within the report. Cardiff Council recommended a terrestrial invertebrate survey be undertaken, with a particular aim to search for two bumblebee species; Shrill Carder-bee *Bombus sylvarum* and Brown-banded Carder-bee *Bombus humilis.* Both bee species are Species of Principal Importance (Wales) under the Environment Act 2016 and the former species is Nationally Scarce. Both species have been previously recorded on the Gwent Levels SSSI.

2.0 METHODOLOGY

Habitats

2.1 The survey concentrated on those habitats identified within the Arup Phase 1 Habitat Map, as having the potential to support a range of terrestrial invertebrate species. These included:

- Semi-improved grassland
- Marshy grassland
- Ruderal vegetation
- Woodland edges

2.2 A total of six survey sites were chosen across the site (see Figure 2, below).

Techniques

2.3 At each of the six survey sites, the following terrestrial invertebrate survey methods were used:

- Sweep-netting: an insect net was swept over the vegetation to collect terrestrial invertebrates. This was used in conjunction with a pooter to collect very small invertebrates.

- Hand-searching: any piles of deadwood, refugia, rubble etc. were destructively hand-searched.

- Beating: A sheet was placed beneath vegetation, such as trees and ruderal vegetation, and the vegetation was beaten to dislodge invertebrates.

- Pootering: A pooter was used during all the above methodologies to catch smaller invertebrates which would otherwise have been missed.

- Suction-sampling: An inverted leaf blower was used in habitats where pitfall trapping was not possible (due to cattle presence and public interference).

Taxon Groups

2.4 Surveying concentrated on specific invertebrate orders, all of which contain ecological indicator species. Within some orders, only certain families have been included in the survey scope due to the habitats present. The following terrestrial orders were surveyed for:

- Diptera (true flies)
- Coleoptera (beetles)
- Lepidoptera (butterflies and day-flying moths)
- Odonata (damselflies and dragonflies)
- Hymenoptera (bees and wasps)
- Hemiptera (true bugs)
- Araneae (true spiders).

Personnel & Timing

2.5 Dr. Rachel Hacking and Andy Harmer (Principal Ecologists) undertook the field work. The surveyors have over twenty years of experience in ecological consultancy and specialise in aquatic and terrestrial invertebrate surveys. Three survey visits were made; in 24th-26th June, 24th-26th July and 11th-13th September 2019. These are optimum times for invertebrate surveys and allow the sample to include mid and late breeders/flying times.

Identification

2.6 All invertebrates caught were potted in 70% ethanol to be identified later, unless identification could be made in the field, in which case the animal was released. Following the survey visits, identification of the specimens was undertaken. Rachel Hacking (Principal Ecologist and Cheshire Carabidae recorder) identified the Coleoptera with critical specimens being sent to Mike Denton FRES, a Coleoptera recorder for south Yorkshire. The Diptera specimens were sorted and sent to Stephen Hewitt, an expert Dipterist at Liverpool Museum. Other orders were identified by either Andy Harmer, Rachel Hacking or by other taxonomic experts.

2.7 The invertebrates were assessed for rarity designations. Red Data Book species are our rarest species and are found in less than 16 10km squares of the National Grid. Nationally Scarce species are known to occur in 100 or fewer 10km squares of the National Grid. If enough is known about the species, i.e. its ecology and distribution, then the Nationally Scarce designation is split into Notable A and Notable B (Na species occur within 16 - 30 10km squares, Nb between 31 – 100 10km squares). Designations are taken from Falk (1991), Foster (2010), Hyman & Parsons (1992) and the NBN Gateway.

2.8 Some species mentioned in the text are considered ‘Local’. These are not scarce but have restricted habitat requirements. Botanical nomenclature follows Stace, 2010. See References for invertebrate nomenclature authors.

Survey Constraints

2.9 On all of the sites, static collection techniques were not used (i.e. pitfall traps, yellow bowl traps or malaise traps). This was due to cattle being present and/or public access was available to the sites.

2.10 During some site visits, the weather conditions were not optimum for terrestrial invertebrate survey (e.g. light rain). Therefore, on some of the visits, invertebrates may have been missed. However, the weather was never severe and the amount of taxa gathered is considered to be robust enough to properly assess the invertebrate assemblage present.

2.11 The invertebrate survey guidelines recommend that for an optimal assessment, sites are visited over a long survey period, including over more than one year. Therefore, it is possible that invertebrates may have

been missed. However, the results gathered in 2019 are robust enough to allow an assessment of the potential value of the site to invertebrates to be undertaken.

3.0 RESULTS

3.1 A total of 235 species of terrestrial invertebrate were recorded across the whole survey area in 2019 (see Table 1 for a breakdown of the totals per taxonomic group).

Table 1. Total number of species per taxonomic group	
Taxonomic group:	**No. of species:**
Diptera (true flies)	69
Coleoptera (beetles)	84
Lepidoptera (moths and butterflies)	15
Hymenoptera (bees, ants and wasps)	7
Hemiptera (true bugs)	44
Araneae	10
Odonata	6
TOTAL NO. OF SPECIES	**235**

3.2 No legally protected or Red Data Book species were found.

3.3 One Nationally Scarce species of terrestrial invertebrate was recorded. This was *Meligethes fulvipes*, a black pollen beetle which is found in marshy areas. It has scattered records across the UK and is found on the coast in South Wales. This species was swept from the tall, ruderal vegetation around Hendre Lake (Site 5).

3.4 A 'naturalised' species was recorded, within the damp grassland (Site 3). This was *Axinotarsus marginalis*, a flower beetle that has recently colonised the UK and is spreading north and west from its stronghold in the south-east. The NBN Gateway shows only one confirmed record for this species from Wales and that lies north of Usk. This species is currently uncommon in Wales.

3.5 The results below describe each of the survey sites and the invertebrate interest at each site. Please see Appendix 1 for the raw data. Figure 2 shows the site locations.

Figure 2 – Sample Site Locations (base plan courtesy of Arup)

Site 1

3.6 Site 1 comprises small fields of semi-improved grassland, north of the railway line (see Photographs 1 and 2). All fields had similar species composition. The grassland comprises species such as Soft Rush *Juncus effusus*, Meadow Buttercup *Ranunculus repens*, Crested Dog's-tail *Cynosurus cristatus*, Meadow Vetchling *Lathyrus pratensis*, Creeping Cinquefoil *Potentilla reptans*, Perennial Rye-grass *Lolium perenne* and Silverweed *Potentilla anserina.* The grassland is not floristically-rich and is grazed. The fields are bordered by dense scrub, comprising Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Dog Rose *Rosa canina* agg., and Bramble *Rubus fruticosus* agg. The scrub belts were walked and searched for Bumblebees and Butterflies.

3.7 A total of 73 species of terrestrial invertebrate were recorded from Site 1. This total includes 25 species of Diptera and 24 species of Coleoptera, including the Local soldier beetle *Cantharis lateralis*, the Local dung beetle *Onthophagus similis* and the Local rove beetle *Paedurus littoralis*. Three species of adult Odonata were observed hunting over the grassland. Six species of Hemiptera were recorded including the Hawthorn Shieldbug *Acanthosoma haemorrhoidale.* Seven species of Lepidoptera were observed, including Green Longhorn Moth *Adela reaumurella* on the scrub belts and Speckled Wood *Pararge aegeria* flying along the scrub. The Species of Conservation Concern (Wales)

Cinnabar *Tyria jacobaeae* was found here. The larvae were found on Common Ragwort *Jacobaea vulgaris.*

Photograph 1 showing the grassland at Site 1 (northern end)

Photograph 2 showing part of Site 1 (southern end)

Site 2

3.8 Site 2 comprises a small pocket of marshy grassland close to Faendre Reen (see Photograph 3). The grassland is surrounded by dense scrub. Species within the marshy grassland include Floating Sweet-grass *Glyceria fluitans*, Greater Bird's-foot Trefoil *Lotus pedunculatus*, Marsh Bedstraw *Galium palustre* and Great Willowherb *Epilobium hirsutum.*

3.9 A total of 49 species of terrestrial invertebrate were recorded from Site 2. The total includes 16 species of Diptera and 16 species of Coleoptera, including the Local soldier beetle *Cantharis nigra* and the local wetland beetle *Kateretes pusillus.* Two Local leaf beetles were also found here; *Epitrix pubescens* and *Psylliodes dulcamarae*, both found on Bittersweet *Solanum dulcamara*, which occurred frequently around and within the grassland. Four species of adult Odonata were seen on this habitat.

Photograph 3 showing the marshy grassland at Site 2

Site 3

3.10 Site 3 comprises small fields of semi-improved grassland, which is mainly damp, to the north of, and adjacent to, the railway line (see Photographs 4 and 5). Site 3 supports the greatest botanical species diversity of all the sites sampled and also supports deadwood habitat. Species include Common Fleabane *Pulicaria dysenterica*, Grass Vetchling *Lathyrus nissolia*, Black Knapweed *Centaurea nigra*, Selfheal *Prunella vulgaris*, Marsh Ragwort *Senecio aquaticus*, Red Bartsia *Odontites vernus*, Wild Carrot *Daucus carota*, Canadian Fleabane *Erigeron canadensis*, Meadow Vetchling *Lathyrus pratensis* and Sweet Vernal-grass *Anthoxanthum odoratum.* Piles of deadwood exist here and these were searched for invertebrates.

3.11 A total of 100 species of terrestrial invertebrate were recorded from Site 3. This total includes 21 species of Diptera, including nine species of hoverfly. 42 species of Coleoptera were recorded, including the 'naturalised' flower beetle *Axinotarsus marginalis* and 7 species of Local beetle, such as the ground beetle *Stomis pumicatus*, the ant beetle *Anthicus antherinus* and the Sixteen-spot Ladybird *Tytthaspis sedecimpunctata*. Six species of Lepidoptera were observed and 19 species of Hemiptera were netted.

Photograph 4 showing the damp grassland at Site 3

Photograph 5 showing the deadwood piles and mature trees at Site 3

Site 4

3.12 Site 4 lies south of the railway line and comprises two linear fields of semi-improved grassland (see Photograph 6). The species composition is similar to Site 1 but with less grazing pressure at the time of the survey visits, therefore the sward was taller. Species include Soft Rush *Juncus effusus*, Spear Thistle *Cirsium arvense*, Black Knapweed *Centaurea nigra*, Crested Dog's-tail *Cynosurus cristatus* and Meadow Buttercup *Ranunculus acris.*

3.13 A total of 52 species of terrestrial invertebrate were recorded from Site 4. This total included 10 species of Diptera and 16 species of Coleoptera,

including 7 species of leaf beetle and the Local fly *Sapromyza sexpunctata*, which is characteristic of grasslands. Four species of adult Odonata were observed flying over the site and 12 species of Hemiptera were netted.

Photograph 6 showing Site 4

Site 5

3.15 Site 5 is a band of tall, ruderal vegetation at Hendre Lake (see Photograph 7). Species include Wild Carrot *Daucus carota*, Hogweed *Heracleum sphondylium*, Upright Hedge-parsley *Torilis japonica*, False Oat-grass *Arrhenatherum elatius*, Common Mugwort *Artemisia vulgaris*, Teasel *Dipsacus fullonum* and Tufted Vetch *Vicia cracca.*

3.15 A total of 59 species of terrestrial invertebrate were recorded from Site 5. This total included 25 species of Diptera and 11 species of Coleoptera, including the Nationally Scarce pollen beetle *Meligethes fulvipes* and Local Sixteen-spot Ladybird *Tytthaspis sedecimpunctata*. Seven species of Lepidoptera were observed across the flowering plants, including Orange-tip Butterfly *Anthocharis cardamines* and Gatekeeper *Pyronia Tithonus.* The larvae of Cinnabar moth *Tyria jacobaeae*, a Species of Conservation Concern (Wales), were observed on Common Ragwort *Jacobaea vulgaris.* Seven species of Hemiptera were netted and 5 species of Hymenoptera were recorded.

Photograph 7 showing the ruderal vegetation lining the path at Site 5

Site 6

3.16 Site 6 is the woodland edge, adjacent to Faendre Reen, at the north-western end of the site (see Photograph 8). The woodland edge is lined with ruderal species such as Hogweed *Heracleum sphondylium*, Common Nettle *Urtica dioica*, Bindweed *Calystegia sepium* and grasses such as False Oat-grass *Arrhenatherum elatius* and Reed Canary-grass *Phalaris arundinacea.*

3.17 A total of 43 species of terrestrial invertebrate were recorded from Site 6, including 9 species of Diptera and 10 species of Coleoptera. Four species of Lepidoptera were observed and 16 species of Hemiptera were netted.

Photograph 8 showing Site 6

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Six sample sites were chosen for the terrestrial invertebrate survey for Cardiff Parkway, St. Mellons. One Nationally Scarce species was recorded. This was *Meligethes fulvipes*, a pollen beetle. No legally protected invertebrate species were recorded. This was recorded from the ruderal vegetation surrounding Hendre Lake. No legally protected invertebrate species were found.

4.2 The Nationally Scare terrestrial invertebrate found on site, as well as many of the Local species, requires flowering plant species, such as umbellifers and members of the pea family. A long pollen and nectar season is required, due to the species having either a long flight period or two emergence times.

4.3 The most species-rich invertebrate site was Site 3, with a total of 100 terrestrial invertebrate species recorded, which corresponds to a greater number of flowering plant species in this habitat, compared to the other habitats. Site 6 recorded the lowest invertebrate species-richness with 43 species of terrestrial invertebrate recorded. This is due to the species-poor nature of the habitat and lack of multiple flowering species.

4.4 No qualifying species for the Gwent Levels – Rumney & Peterstone Site of Special Scientific Interest (SSSI) were found on the site but as a whole, the grazing marsh and associated reens qualify for the SSSI status. Shrill Carder-bee *Bombus sylvarum* and Brown-banded Carder-bee *Bombus humilis* were not recorded during the survey visits. This study focussed on terrestrial invertebrates, for a single survey season, on the proposed development site, which is a small parcel of land within the Gwent Levels SSSI. The habitats surveyed were all relatively botanically species-poor.

4.5 At this stage, detailed plans for the site are still being drafted. However, it is anticipated that most of the habitats on the site north of the railway line, with the exception of Hendre Lake and the area between Cypress Drive and Faendre Reen, will be affected by the proposals. Land to the south of the railway will provide mitigation areas. Invertebrate mitigation is closely tied to botanical mitigation. Good terrestrial invertebrate habitat includes multiple species of flowering plant, open ground and structural diversity. Therefore, it is recommended that species-rich wildflower grassland, including both wet and dry examples, be created or improved within the site. Newly created habitats should use seed of local provenance and be cut annually or subject to suitable grazing regime. Existing habitats could be enhanced by change in agricultural practices and localised vegetation removal as appropriate. Butterfly banks, habitat piles and scrub belts could also be designed, to increase structural diversity and botanical species diversity as part of the overall ecology mitigation strategy for the project.

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APPENDIX 1 – TERRESTRIAL INVERTEBRATE SURVEY RAW DATA

Species/Site	Designation	1	2	3	4	5	6
DIPTERA (TRUE FLIES)							
Tipulidae:							
Tipula oleracea		+					
Tipula maxima				+		+	+
Tipula paludosa		+				+	
Limoniidae:							
Erioconopa trivialis			+				
Molophilus obscurus						+	
Ptychopteridae:							
Ptychoptera albimana							
Bibionidae:				+			
Dilophus febrilis		+					
Rhagionidae:							
Chrysopilus cristatus				+		+	
Rhagio scolopaceus					+		
Tabanidae:							
Haematopota pluvialis		+	+	+	+		
Stratiomyidae:							
Beris vallata			+				
Chloromyia formosa				+		+	
Chrorisops tibialis			+				
Hybotidae:							
Bicellaria sulcata		+					
Empididae:							
Empis livida		+				+	
Empis tessellata				+			
Dolichopodidae:							
Chrysotus gramineus			+	+			
Dolichopus plumipes		+					
Dolichopus simplex				+			
Poecilobothrus nobilitatus		+		+	+	+	+
Syrphidae:							
Cheilosia albitarsus		+		+			
Cheilosia scutellata			+				
Chrysotoxum bicinctum			+				
Chrysotoxum festivum		+					
Episyrphus balteatus		+			+	+	
Eristalis arbustorum		+		+		+	
Eristalis pertinax							+
Eristalis tenax		+					
Helophilus hybridus							+
Helophilus pendulus				+		+	+
Helophilus trivittatus				+			

Species/Site	Designation	1	2	3	4	5	6
Melanostoma mellinum		+		+	+		
Melanostoma scalare				+			
Myathropa florea			+				
Neoascia podagrica						+	
Neoascia tenur		+					
Platycheirus albimanus						+	
Rhingia campestris						+	
Scaeva pyrastri		+					
Sphaerophoria scripta			+				
Syritta pipiens				+	+	+	
Syrphus ribesii		+		+			+
Volucella bombylans			+				
Volucella pelluscens						+	
Sciomyzidae:				+			
Dichetophora obliterata							
Mycrochrysa polita		+	+				
Pherbellia cinerella				+			+
Pherbina coryleti					+		
Sepedon sphegea		+				+	
Sepedon spinipes		+					
Lauxanidae:							
Minettia rivosa					+		
Minettia tubifer							
Sapromyza sexpunctata	Local		+		+		
Sapromyza sordida						+	+
Sepsidae:							
Sepsis cynipsea						+	
Sepsis fulgens		+		+			+
Opomyzidae:							
Opomyza germinationis			+				
Sphaeroceridae:							
Copromyza nigrina		+					
Scathophagidae:							
Scathophaga stercoraria		+	+		+	+	
Muscidae:							
Coenosia testacea			+				
Coenosia tigrina						+	
Helina lasiophthalma			+				
Helina reversio				+		+	
Hydrotaea irritans		+					
Mesembrina meridiana						+	
Calliphoridae:							
Lucilia caesar		+					
Lucilia sericata						+	
Pollenia rudis						+	

Species/Site	Designation	1	2	3	4	5	6
Sarcophagidae:							
Sarcophaga carnaria						+	
TOTAL DIPTERA		**25**	**16**	**21**	**10**	**25**	**9**
COLEOPTERA:							
Carabidae:							
Abax parallelepipedus				+			
Agonum fuliginosum				+			
Amara aenea						+	
Bembidion guttula				+			
Harpalus rufipes			+			+	
Microlestes maurus				+			
Nebria brevicollis							+
Notiophilus biggutatus				+			
Pterostichus madidus							+
Pterostichus niger				+			
Stomis pumicatus	Local			+			
Oedeomeridae							
Oedemera lurida	Local	+		+			
Oedemera nobilis		+	+	+			
Hydrophilidae:							
Cercyon haemorrhoidalis					+		
Mergasternum concinnum				+			
Sphaeridium lunatum		+					
Helophoridae:							
Helophorus brevipalpis		+					
Helophorus grandis		+					
Hydraenidae:							
Hydraena riparia	Local			+			
Dryopidae:							
Dryops luridus				+			
Scraptiidae							
Anaspis frontalis		+					
Anaspis maculata			+			+	+
Staphylinidae:							
Ocypus olens							+
Paedurus littoralis	Local	+					
Paedurus riparius	Local			+			
Stenus boops				+			
Stenus juno		+					
Malachiidae:							
Axinotarsus marginalis	Naturalised			+			
Scarabaeidae:							
Onthophagus similis	Local	+					
Latrididae:							
Corticarina minuta					+		

Species/Site	Designation	1	2	3	4	5	6
Cortinicara gibbosa		+					
Scirtidae:							
Contacyphon padi			+				
Microcara testacea				+			
Anthicidae:							
Anthicus antherinus	Local			+			
Cerambycidae							
Rutpela maculata		+					
Cantharidae:							
Cantharis lateralis	Local	+					
Cantharis livida			+	+			
Cantharis nigra	Local	+	+	+	+		+
Malthodes marginatus		+					
Rhagonycha fulva		+		+	+		+
Kateretidae:							
Brachypterus glaber							+
Brachypterus urticae			+				+
Kateretes pusillus	Local		+				
Nitidulidae:							
Epuraea melanocephala		+	+				
Meligethes aeneus		+			+	+	
Meligethes carinulatus		+					
Meligethes fulvipes	Nationally Scarce					+	
Cryptophagidae:							
Telmatophilus typhae				+			
Byturidae:							
Byturus tomentosus						+	
Coccinellidae:							
Adalia bipunctata - 2-spot			+	+			+
Coccidula rufa				+			
Coccinella septempunctata - 7-spot		+		+	+	+	+
Harmonia axyridis - Harlequin				+			
Propylea quattuordecimpunctata - 14 spot		+		+		+	
Rhizobius litura				+	+		
Scymnus haemorrhoidalis				+			
Tytthaspis sedecimpunctata - 16-spot	Local			+		+	
Tenebrionidae:							
Lagria hirta		+		+	+		
Chrysomelidae:							
Altica lythri				+			
Cassida rubiginosa				+			
Chaetocnema concinna		+	+		+		
Chaetocnema hortensis					+		
Chrysolina polita					+		
Epitrix pubescens	Local		+				

Species/Site	Designation	1	2	3	4	5	6
Gastrophysa viridula		+		+	+		
Longitarsus pratensis				+			
Longitarsus luridus				+	+		
Neocrepidodera ferruginea		+					
Neocrepidodera transversa					+		
Phaedon armoraciae				+			
Phyllotreta undulata					+		
Psylliodes affinis			+				
Psylliodes dulcamarae	Local		+				
Erirhinidae:							
Tanysphyrus lemnae	Local			+			
Apionidae:							
Ischnopterapion loti					+		
Perapion curtirostre				+			
Protapion apricans				+			
Curculionidae:							
Ceutorhynchus typhae						+	
Mecinus pascuorum				+			
Phyllobius pomaceus						+	
Rhinoncus pericarpius			+				
Rhinoncus perpendicularis			+				
Sitona sulcifrons				+			
Sitona suturalis				+			
TOTAL COLEOPTERA		**24**	**16**	**42**	**16**	**11**	**10**
ARANEAE - Spiders							
Lycosidae (Wolf Spiders):							
Pardosa pullata				+			
Pirata piraticus				+			
Clubionidae:							
Clubiona reclusa			+				
Tetragnathidae:							
Metellina segmentata				+			
Tetragnatha extensa		+					
Araneidae:							
Araneus diadematus		+	+	+	+	+	
Larinioides cornutus		+					+
Linyphiidae (Money Spiders):							
Bathyphantes gracilis		+					
Lepthyphantes tenuis					+		
Pisauridae:							
Pisaura mirabilis				+			
TOTAL ARANEAE		**4**	**2**	**5**	**2**	**1**	**1**
LEPIDOPTERA							
Adela reaumurella - Green Longhorn Moth		+					
Aglais urticae - Small Tortoiseshell				+		+	

Species/Site	Designation	1	2	3	4	5	6
Anthocharis cardamines - Orange-tip		+		+		+	
Inachis io - Peacock						+	+
Maniola jurtina - Meadow Brown		+			+		+
Pararge aegeria - Speckled Wood		+			+		+
Pieris brassicae - Large White		+				+	
Pieris napi - Green-veined White		+				+	+
Pieris rapae - Small White					+		
Polyommatus icarus - Common Blue				+			
Pyrausta cingulata - Silver-barred Sable				+			
Pyronia tithonus - Gatekeeper						+	
Thymelicus sylvestris - Small Skipper			+				
Tyria jacobaeae - Cinnibar Moth (larva)		+		+	+	+	
Zygaena filipendulae - 6-spot Burnet				+			
TOTAL LEPIDOPTERA		**7**	**1**	**6**	**4**	**7**	**4**
HYMENOPTERA							
Formicidae:							
Lasius niger				+			+
Apidae:							
Apis mellifera					+	+	
Bombus hypnorum						+	
Bombus lapidarius		+	+	+		+	
Bombus pascuorum		+	+	+	+	+	
Bombus terrestris		+	+	+	+		
Vespidae:							
Vespula vulgaris		+	+	+	+	+	+
TOTAL HYMENOPTERA		**4**	**4**	**5**	**4**	**5**	**2**
ODONATA							
Aeshna cyanea - Southern Hawker		+	+		+		
Aeshna mixta - Migrant Hawker			+				+
Coenagrion puella - Azure Damselfly		+	+	+	+	+	
Ischnura elegans - Blue-tailed Damselfly		+	+	+	+	+	
Lestes sponsa - Emerald Damselfly					+		
Libellula depressa - Broad-bodied Chaser						+	
TOTAL ODONATA		**3**	**4**	**2**	**4**	**3**	**1**
HEMIPTERA							
Aphrophoridae							
Neophilaneus lineatus				+			
Neophilaneus campestris				+			
Philaenus spumarius		+		+	+		+
Cicadellidae							
Aphrodes bicincta				+			
Aphrodes makarovi			+	+			
Cicadella quadrinotata		+			+		
Cicadella viridis				+			

Species/Site	Designation	1	2	3	4	5	6
Conosanus obsoletus					+		
Eupteryx aurata							+
Eupteryx urticae							+
Euscelis incisus				+			
Macrosteles lividus				+			
Psammotettix albomarginatus				+			
Psammotettix confinis					+		
Streptanus sordidus							+
Delphacidae							
Conomelus anceps					+		+
Muellerianella fairmairei				+			
Nabidae							
Nabis rugosa					+		
Lygaeidae							
Cymus melanocephalus					+		
Ischnodemus sabuleti			+				
Scolopostethus thomsoni			+				
Miridae:							
Closterotomus fulvomaculatus							+
Closterotomus norwegicus				+			
Deraeocoris ruber							+
Euscelis incisus					+		
Leptopterna dolobrata		+		+			
Liocoris tripustulatus			+			+	+
Lygocoris pabulinus					+		
Notostira elongata					+		+
Oncotylus viridiflavus				+			
Orthops campestris						+	+
Orthotylus ericetorum				+			
Phytocoris varipes				+		+	
Plagiognathus arbustorium						+	+
Plagiognathus chrysanthemi		+		+			+
Stenodema calcarata				+	+		
Stenodema laevigata				+		+	
Stenotus binotatus		+		+	+		
Anthocoridae:							
Anthocoris nemorum			+				+
Dicyphus epilobii							+
Orius minutus						+	+
Acanthosomatidae:							
Acanthosoma haemorrhoidale - Hawthorn Shieldbug		+					
Pentatomidae:							
Dolycoris baccarum - Hairy Shieldbug			+				
Palomena prasina - Green Shieldbug						+	+

Species/Site	Designation	1	2	3	4	5	6
TOTAL HEMIPTERA		6	6	19	12	7	16
TOTAL TERRESTRIAL INVERTEBRATES PER SITE		73	49	100	52	59	43